Water Resources/Surface Water Impact Assessment Planning Summary Memo
NorthMet Project EIS
June 30, 2011

Introduction

The Minnesota Department of Natural Resources (MDNR), US Army Corps of Engineers (USACE), and US Forest Service (USFS), collectively known as the Co-lead Agencies, have prepared this guidance memo as the concluding step in the impact assessment planning (IAP) process for this subject area. This memo provides: (1) a summary of workgroup issues considered; and (2) specific guidance to PolyMet Mining and its consultants that is to be incorporated into a work plan for Co-lead Agency review and approval prior to conducting impact analysis, (i.e., modeling and other predictive work), on the Draft Alternative Summary, as amended March 4, 2011.

Facilitators

John L. Adams, ERM
Michael Liljegren, MDNR

Workgroup Interaction

The Surface Water (SW) IAP Group held four meetings; minutes were prepared for each session. Most members participated by conference call and/or WebEx. Meetings were held:

- November 23, 2010: reviewed meeting protocol, future agenda items, meeting locations, and meeting procedures.
- December 21, 2010: all-day meeting based at Barr's office. Barr made two technical presentations. Follow-up tasks were assigned.
- February 14, 2011: Barr made technical presentation; reviewed conclusions/positions for all previously-discussed issues.
- March 31, 2011: final Surface Water IAP meeting. Greg Kruse (MDNR hydrologist) presented baseflow gagings on the Partridge River and Embarrass River; Barr presented West Pit outflow hydrology estimates and concept for modeling Embarrass River tributary streams near tailing basin. No further Surface Water IAP meetings are planned.

See Attachment A for a listing of the Surface Water IAP team membership.

Impact Assessment Requirements of Agency Draft Alternative

Baseline Data

Baseline streamflow data available for assessment of the Agency Draft Alternative (DA) includes all of the streamflow records used for the October-2009 Draft EIS, plus additional winter baseflow gagings taken by the MDNR during the winters of 2008, 2010, and 2011. Data was collected at: (1) several locations along the Partridge River; (2) South Branch of the Partridge River; (3) two locations along the Embarrass River (2010 and 2011 only); and (4) Longnose and Wyman Creeks. Final gagings were completed March 15-16, 2011; (see G. Kruse spreadsheet; final report attached).

Cooperating Tribal Agency representatives note that the data used in the 2009 DEIS was found to be inadequate for the purposes of the DEIS. They also believe that there has been no credible justification for reusing this data in the SDEIS, that although winter baseflow 2010-2011 data collected by the MDNR is helpful, it does not address all of the longstanding data adequacy concerns for this project. The Co-lead Agencies believe that use of the USGS data and the XP-SWMM model is appropriate. Results of the winter baseflow study completed by MDNR (see references #14 and #15) help support that conclusion.

Baseline water quality data for the Partridge and Embarrass Rivers used in the DEIS has been supplemented with additional data collected by Barr in 2010. Additional data has been collected for monitoring locations PM-11 and PM-19 for sulfate and chloride, and a suite of analysis has been collected for Colby Lake. Limited water quality data exists for monitoring location PM-6 on Wyman Creek, approximately one mile upstream of the railroad crossing. This data is not reflective of water quality at the railroad crossing. Data from monitoring location PM-5 is ideally located to characterize existing water quality below the railroad crossing.

In terms of analysis for both dissolved and total metals, the only parameter for which MPCA staff recommended analyzing both total and dissolved fractions is aluminum. The purpose of this recommendation is to obtain sufficient data to be able to calculate, as appropriate, a dissolved:total "translator" for aluminum that could be applied during permitting as allowed under MPCA rules. Monitoring for aluminum in NE Minnesota has often identified a significant difference between dissolved and total aluminum in many waters. MPCA staff did not recommend analyzing for total and dissolved fractions for any of the other metals; this is volunteered by PolyMet exclusively.

Baseline water quality data collection has been initiated downstream of the railroad crossings on the West Pit outflow stream (WP-1), Wetlegs Creek (WL-1), and Longnose Creek (LN-1). The Co-lead Agencies believe that sampling downstream of the railroad crossing is sufficient for generally characterizing the existing water quality condition of these streams. The Co-lead Agencies also note that upstream and downstream sampling would be an appropriate strategy for permit monitoring in order to adequately document all potential sources of contaminants in addition to rail car spillage. Upstream/downstream sampling should commence as soon as permits are issued and continue for at least one year prior to use of the railroad track by PolyMet.

Water quality data collection has also been initiated on Mud Lake Creek (MLC-1). Streamflow is also being gaged at WP-1 and MLC-1 at the time of water quality sampling. In addition, stream geomorphic data (e.g., stream cross sections and gradients) is being collected starting spring, 2011, for the West Pit outflow stream and Spring Mine Creek; see Barr's 2011 Surface Water Monitoring Plan for Tributaries near PolyMet NorthMet Site, REVISED 04/22/2011, and Dave Blaha email dated 05/03/11.

<u>Modeling Method – Partridge River and Tributaries</u>

The modeling method used in the 2009 Draft EIS for the main branch of the Partridge River is similar to what will be required for the Agency DA. For the Agency DA, the XP-SWMM model was calibrated to 23 flow parameters using the 1986-1987 water years flow records, then scaled to better match actual 1986-1987 water years when there was no dewatering from the Peter Mitchell Pit (PMP). This method reduces the impact of future PMP dewatering on project impact analysis when using the XP-SWMM model to predict future hydrologic changes at various locations along the Partridge River near the mine site. No adjustment for potential climate change during PolyMet's 20 year life expectancy is planned; see Barr's Water Modeling Package Version 5 [WMPv5]. The proposed method for estimating Partridge

River baseflow, which is necessary for modeling water quality impacts during extreme low flow conditions, is outlined in WMPv5, Sectioni 3.4.1.1.3. The specifics of the XP-SWMM calibration procedure are discussed in Section 5.1 of RS73A. The 23 flow parameters are referred to as "Richter Statistics," and are described in Section 3.2 of RS73B.

Streamflow modeling has been done for the West Pit outflow (under closure condition) for both the Continuous and Seasonal outflow concepts, and for the West Pit outflow stream, in order to help assess potential stream geomorphic impacts.

Modeling Input Assumptions/Outputs – Partridge River and Tributaries

The proposed modeling method assumes that use of the XP-SWMM model, calibrated to the two years when the PMP was not being dewatered, produces reasonably accurate estimates of Partridge River flow parameters near the mine site for hydrologic and water quality modeling. Baseflow in the Partridge River near the mine site, which is needed for water quality modeling, is assumed to be reasonably equivalent to the XP-SWMM-modeled average 30-day minimum flow during the winters of 1985, 1986, and 1987 when there was no PMP dewatering; see Water Modeling Package v5, Section 3.4.1.1.3. Preliminary evaluation of the MDNR 2011 winter gaging data suggests that the modeled baseflows near the mine site are conservatively low.

Modeling outputs for the Partridge River near the Mine Site would be similar to those produced for the Draft EIS; see Chapter 4.1, 2009 PolyMet Draft EIS.

The XP-SWMM model was also used to estimate selected flow parameters for the West Pit outflow stream, in turn for use in water quality and stream geomorphic analyses. Limited field measurements of stream geometry are anticipated for spring 2011 to confirm modeling estimates.

Modeling Method-Embarrass River and Tributaries

Given the anticipated small volume of un-captured seepage leaving the tailings basin (see reference #13), modeling of hydrologic impacts to the main branch of the Embarrass River is not proposed. Barr will quantify the seepage capture efficiency as part of modeling seepage outflow from the tailings basin. Uncaptured seepage volumes will be added to calculated low, average, and high flows from historic Embarrass River data (USGS gage 04017000), to quantify the impacts. The hydrology of Embarrass River tributary streams receiving seepage from the tailing basin will be modeled (input to water quality modeling) by unit-area extrapolation of data from the main branch. The quantity of seepage reaching the streams will be validated by Barr using existing water quality data; see WMPv5, Section 4.2.4.

Embarrass River tributary streams below the tailing basin will be modeled by unit-area extrapolation from the USGS Embarrass River data; see WMPv5, Section 4.2.4.

Modeling Input Assumptions / Outputs – Embarrass River and Tributaries

No streamflow modeling is proposed for the main branch of the Embarrass River. It is assumed that the unit-area runoff of the tributary streams below the tailing basin is similar to the Embarrass River watershed.

Key Issues and Decisions at the Mine Site

1. Adjustment of USGS data for climate change and Peter Mitchell Pit dewatering. Barr recommended an adjustment procedure to account for PMP dewatering, but concluded no adjustment warranted for climate change based on comparison with South Kawishiwi River long-term USGS gage record. The Co-lead Agencies concur with this recommendation; see Mine Site Points of Disagreement #1; also see WMPv5, Sections 3.4.1.1.1 and 3.4.1.1.2.

2. West Pit outflow evaluation point and outflow channel baseline data. Barr presented West Pit outflow estimates and XP-SWMM model estimates for present hydrology of outflow stream (WMPv5, Section 4.1.6). Baseline water quality and stream geomorphic data are to be collected spring, 2011. West Pit outflow evaluation location established at pit outlet. The Co-lead Agencies concur with the recommendations.

3. Modeling water quality of high flow events. GLIFWC suggested water quality modeling for outflow from the Mine Site be done for high flows as well as base flows. The Co-lead Agencies believe the concern is addressed because Barr will use probabilistic approach, one that models a broad range of flow conditions.

4. Partridge River baseflow gagings/interpretation. MDNR gagings were completed 03/16/2011. Greg Kruse presented gaging conclusions and interpretations to the workgroup. Data interpretations and conclusions were discussed. MDNR's final report was submitted in June, 2011, along with Barr's comparison of the gaging results of the XP-SWMM model projections; see references #14 and #15.

5. Groundwater contribution to Partridge River baseflow. This parameter is necessary for water quality modeling. Greg Kruse concluded from the MDNR winter gagings that the primary source of baseflow is surficial groundwater and wetland drainage. Final MDNR report pending; also see WMPv5, Section 3.4.1.1.3. The Co-lead agencies support the findings.

6. Stockpile hydrology modeling method. Barr presented conceptual model for estimating all components of stockpile hydrology, including runoff and deep seepage; see WMPv5, Section 4.1.2. The Co-lead Agencies support the conceptual model for use in the SDEIS.

7. Impacts to Colby Lake and Whitewater Reservoir. Available information is considered adequate to evaluate effects. The Co-lead Agencies note that hydrologic impacts to Colby Lake / Whitewater Reservoir for the SDEIS draft alternative will be less than those documented in the DEIS since PolyMet will be pumping much less water from Colby Lake.

8. Cumulative Partridge River impacts below Colby Lake. The Co-lead Agencies support the USEPA recommendation for a qualitative evaluation of this issue. This is because downstream, cumulative impacts to the St. Louis River are not expected to be modeled since the PolyMet EIS will precede the Mesabi Nugget EIS, and procedures for Nugget will be largely unknown. However, modeling results for the Upper Partridge River and Colby Lake can be used to "semi-quantitatively" document impacts to the St. Louis River.

9. Use of USGS data and the XP-SWMM model for streamflow estimation near the mine site. Cooperating Tribal Agencies believe this approach is inadequate, that at least one year of near-site flow record is necessary for model verification and impact analysis. Co-lead Agencies have considered the issue and believe the proposed approach to be adequate, given the anticipated magnitude of hydrologic alteration (maximum Partridge River watershed area disturbed by PolyMet is less than 7% at any location along the river). Actual watershed alteration will be more accurately determined during modeling of hydrologic impacts for the Agency DA.

   Barr has proposed a method of estimating baseflow in the Partridge River, a critical input for water quality modeling; the Co-lead Agencies support the proposed methodology. Meeting notes from USEPA Chicago meeting state that Barr is to re-evaluate the baseflow estimate for the Partridge River following the collection of new baseflow measurements by the MDNR. Cursory evaluation of MDNR gagings suggests that the XP-SWMM estimates are conservatively low. Barr will be required to technically evaluate the data with assistance from MDNR. The Chicago notes also state that USEPA concluded that the Partridge River low flow estimates were determined to be conservatively low and acceptable for water quality modeling purposes.

10. Baseline water quality for railroad corridor streams. USEPA and Cooperating Tribal Agencies expressed concern that baseline water quality data be collected for all streams along the railroad corridor. The Co-lead Agencies recommended an approach where PolyMet begins data collection this spring to provide some data to characterize existing condition for the SDEIS, and then continue data collection into permitting period; see reference #3. USEPA agreed to this approach, pending documentation that railroad car spillage was the only potential impact. Supporting information includes: watershed maps; Barr's NorthMet Data Package/Water v5; and rationale showing that the only impact to the railroad streams was potential ore spillage (see reference #4).

    The Co-lead Agencies agree that quantification of streamflow for contaminant load determination is warranted as part of the permit monitoring, but is unnecessary for characterizing stream water quality for the SDEIS. Barr will be producing a total project monitoring plan that will be available for review and comment.

    The Co-lead Agencies also note:

    - Discharges SD-008, SD-009, SD-010, SD-011, and SD-012 from Northshore Mining's Peter Mitchell Mining Area (NPDES/SDS Permit No. MN0046981) all potentially discharge to the headwaters of the Partridge River (e.g., Yelp Creek), and not to any of the tributaries that are part of the 2011 Tributary Monitoring Plan. Currently only SD-099 is significantly discharging, at a flow rate of approximately 7 MGD. There is no discharge from SD-008, SD-011, and SD-012, and there is a <0.01 MGD discharge from SD-010. As such none of the Northshore outfalls would be affecting the tributary creeks.
    - Discharges SD-010, SD-011, SD-012, and SD-030 from Cliff's Erie's Hoyt Lakes Mining Area all potentially discharge (directly or indirectly) to Wyman Creek upstream of the railroad corridor. Currently there are discharges from only SD-030 (to the headwater of Wyman Creek approximately 1.5 mi upstream of the railroad corridor) and SD-012 (to Wyman Creek approximately 0.5 mi upstream of the railroad) – outfalls SD-010 and SD-011 are not currently discharging and have not discharged in more than 15 years.

Discharges/runoff from the Cliff's Erie property outside of the proposed PolyMet project area could be impacting area surface waters such as Wyman Creek. However, any ongoing contribution from these "legacy" discharges would be part of the current baseline conditions at the railroad corridor and would be reflected in the baseline monitoring that is already being established at PM-5.

A Surface Water Monitoring Plan (04/11/2011; Revised 04/22/11) has been developed for the proposed collection of new data; see reference #1. Submittal of this plan initiated a series of comment letters and memos between the USEPA and the lead agencies (see references #8, #9, #10, #11, and #12). USEPA expressed concern about two issues: (1) monitoring locations for the railroad crossing streams; and (2) what they believe is a general lack of substantiation in the agencies responses.

In considering the full set of documentation, the Co-lead Agencies note that the IAP process is intended to principally address baseline data needs for impact modeling. The Co-lead Agencies believe that limited downstream water quality data, collected prior to the SDEIS, will be useful for describing existing baseline conditions. The Co-lead Agencies also believe that an upstream / downstream monitoring approach, including streamflow, should be implemented as part of MPCA's permitting process at least one full year prior to use of the railroad by PolyMet.

Data needs for permit monitoring assessment are best addressed during review of upcoming monitoring plans being developed by PolyMet/Barr. Remaining concerns will be addressed in that review process. Relevant information generated to this point includes, but is not limited to, the following:

- USEPA's 05/05/11 letter (see Reference #10) which notes, "the proposed sampling sites seem appropriate and should provide the needed data to establish baseline conditions in these small, largely unimpacted headwater streams."
- The Wetlegs Creek watershed area within the PolyMet project area was calculated at 78.8 acres, which is less than 4% of the Wetlegs Creek watershed. Very little, if any, of the 78.8 acres within the PolyMet project area will be impacted by PolyMet. The exact amount will be quantified and evaluated as part of the SDEIS process.
- This small hydrologic alteration does not result in significant environmental impacts, and could not be detected with streamflow monitoring. This further supports the conclusion that railroad car spillage is the only source of any potentially significant impact.
- Wetlegs Creek is the only railroad crossing stream, other than the West Pit outflow stream, that has any watershed area consumed by the PolyMet project.

REFERENCES

1. NorthMet Project, Water Modeling Package, Version 5, March 24, 2011(future issues to be updated), Barr Engineering.
2. USEPA Chicago meeting minutes, 12/08/2010.
3. J. Adams 03/02/11 email to USEPA (Simon Manoyan), and USEPA 03/08/11 response memo.
4. J. Adams 03/29/11 email to USEPA (Simon Manoyan), USEPA response pending.
5. Greg Kruse/Mike Liljegren 03/29/11 and 03/30/11 emails and spreadsheet of Partridge and Embarrass River baseflow measurement summary.
6. J. Adams 03/07/11 email to John Coleman and J. Coleman's 04/12/11 response.

7. Meeting minutes from four SW IAP meetings, 11/23/10, 12/21/10, 02/14/11, and 03/31/11.
8. 2011 Surface Water Monitoring Plan for Tributaries near PolyMet NorthMet Site – REVISED, Barr Engineering, 04/22/2011.
9. D. Blaha email to Simon Manoyan, with spreadsheet attachements, 05/03/11.
10. USEPA letter commenting on Barr's 2011 REVISED monitoring plan, 05/05/11.
11. Agency response to USEPA's 05/05/11 letter, 05/10/11.
12. USEPA letter responding to Agency's 05/10/11 memo, 05/16/11.
13. Wyman, Longnose, and Wetlegs Watershed Areas Map 5-18-11.
14. MPCA NorthMet – Impact Criteria – Permittability Memo 06/20/11.
15. Partridge River Watershed Winter 2010-2011 Base Flow Analysis, MDNR, June, 2011.
16. Comparison of MDNR Winter Flow Gaging to Partridge River XP-SWMM Model, Barr Engineering, June 09, 2011.

ATTACHMENT A
Surface Water IAP Participants

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